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ABSTRACT

Both the broad field of educational technology and research activities in the more limited area of instructional technology in Latin America are examined. Research studies, the current situation, and/or research needs are reviewed briefly for each of the following areas: distance education; microcomputers; educational radio; learning strategies and study habits; instructional and text design; problem areas; behavioral objectives; democratization; student role; cognitive styles; and the effectiveness of educational technology in terms of its utility for educational systems in Latin America. Transfer and implementation studies are noted as being significant innovations in educational improvement in Latin America; and the importance of valuing the ideas, beliefs, interests, and role of the recipients of these innovations, giving them greater levels of participation in critical decisions, and responding to their cognitive styles and interests, is stressed. Most of the 50 references listed are in Spanish. (KM)

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Instructional Technology Research in Latin America

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Introduction

This brief paper will expand some information about the general field of educational technology given previously (Chadwick, 1982) and will examine in somewhat more detailed form the research activities in the more limited area of instructional technology. The field of educational technology has had great growth and has managed to establish itself fairly well in Latin America, despite a series of philosophical and political problems related to its definitions (for example, see Gonzalez, 1976 or Sarramona, 1983). An example of this growth is the existence of educational technology associations (by one name or another) in at least five countries: Brasil, Chile, Venezuela, Argentina, Colombia, and centers of educational technology at the Ministerial and/or University level in almost all of countries (Chadwick, 1982, 1978, Romiszowski and Chadwick, 1980). (In this context it is important to remember that we are not referring to a homogenous area, but to more than 27 countries with more than 250 million people speaking five different languages, and with highly diverse historical and cultural heritages.)

The area more precisely called instructional technology also has been growing in Latin America, but at a slower rate, and

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confined to serious researchers and specialists interested in basic areas rather than adoption or implementation projects.

Research in educational and instructional technology has had a difficult and complicated development. Most research is fundamentally based on the replication of studies done in the USA or Europe. A standard approach is to see if findings from developed countries can transfer to the different nations of the Latin American zone and what will be the effect of certain different cultural variables.

A second approach is those studies that are directly related to the processes of transfer of technology (for examples see, Restrepo, 1977, and Escotet, 1978). This is logical if we look at the replication process, and the basic macro-variables (economic, politics, etc) which surround the field. The critical questions have been: what technologies developed in the US (and Europe) can be transferred to Latin America, what are the best processes for such transfer, what cultural factors must be taken into account in order to successfuly transfer, what modifications will be necessary, etc? (The *Revista de Tecnologia Educativa* -RTE- has published about twenty articles on transfer processes, including one special issue from an InterAmerican Meeting on the Subject, 1978). A clear understanding of the field of educational technology requires study of transfer documents and we may suggest as particularly useful those mentioned above and Clayton (1978), Oundjian (1978), and Chadwick and Barandiaran (1978).

As an outgrowth of transfer, there are many studies of distance education, particularly at the university level. A

'technology' originally imported from UK, the open university concept has been perceived as an appropriate possibility to advance levels of education in countries which have many problems in reaching enough people, making more democratic the higher education process, extending diverse forms of education, responding to high expectations that have developed in the poorer sections, etc. Methodological issues have been studied extensively (for example, Sarramona, 1980) yet it is difficult to point out a true case of 'success'(Escotet, 1980). RTE has published about twenty articles on this subject, primarily at the University level, including one special number dedicated to the Distance University of Costa Rica, (1981/1982).

But neither the area of transfer studies nor distance education normally produce clearcut research efforts. While these subjects are of great importance their very nature lends itself to developmental projects. Relatively controlled research in instructional technology (with at least a cuasi-experimental design) is more difficult to find in Latin America, but has been growing, particularly in the last decade.

In the following sections we will attempt to identify research studies in the field of instructional technology, grouping them into the general classes of distance education, microcomputers, educational radio, learning strategies and study habits, and instructional and text design.

Distance Education

In the case of distance education, studies exist which have traced the effects of the modality on differing groups of

students, or have tried to determine the primary causes of desertion (Salibian, 1980; Yalli and Romizowski, 1984) finding that lack of good reading skills and habits is a major factor. Calderon, Rivera and Chadwick ((1979) studied factors which may have influenced success in an distance in-service teacher training program in which 32,562 Chilean teachers participated. Only sex and nature of school (private vs. public) showed effects, favoring women over men and private over public schools ($p < .05$).

Microcomputers in Education

This topic has received a great deal of attention, with more then fifty general articles published on the subject in major journals in the last three years, but the number of research studies is quite limited. A typical example of what is happenning in this area is a special number of a journal published by a Chilean University in which twelve interesting and valuable articles were published but only one contained research data, from a survey of teachers' receptivity to the subject (Larrondo Gonzalez, 1984). One of the more important studies was reported by Costi Santarosa (1982) showing that the microcomputer was a more effective testing device than the teacher in cases of students with high levels of anxiety.

Educational Radio

Radio education may be the most widely utilized technology in all of Latin America, but relatively little research has been published. There exists a great deal of information in relation to development and implementation projects, descriptions, cost

analyses, projects evaluations, etc. (see Muhlmann de Masoner, Masoner and Bernal Alarcon, 1977; Jamison and McAnany, 1978; ALER, 1982, for some examples).

Learning Strategies and Study Habits

Research studies in this area have been growing rapidly. The countries which seem to have the most studies and publications are Venezuela and Chile.

In Venezuela the research is primarily directed toward studies of the cognitive processes involved in reading comprehension, academic learning and study habits and strategies. Recently the approach of contrasting experts and novices in learning has been used (Morles, Amat, Donis and Urquhart, 1983). Results have helped to identify the cognitive strategies used by both groups.

Based on these studies efforts have been made to develop training program to improve academic achievement of students at the university level (Morles, 1984, 1985). At the present time these training programs are being carried out in several Venezuelan institutions.

Another area of study is that of information processing aids which has looked at adjunct questions (Poggioli, 1986), notetaking (Fermin, 1985), concept mapping (Solorzano, 1985) and algorythms (Jaque, 1985). While this research is just beginning, it looks very promising (see Orantes, 1983, 1985a and 1985b, for a thorough and interesting discussions of this research).

In a similar effort, Benaim and de Aguirre (1986) applied eighteen thinking tools of De Bono (1980) in a university course

called "Operational Methods of Thinking" to an experimental group with a control group (without random assignment but with no significant differences in terms of high school grade average, verbal and quantitative skills, final entrance grades or accumulated academic index). They found that the experimental group produced a significantly higher number of unusual ideas ($p. >0.01$).

Studies of affective factors and styles of learning are also being done in Venezuela. For example, Romero (1984) has studied locus of control in relation to intelligence and socioeconomic status using academic achievement as his independent variable, finding that control attributions are not related to socioeconomic status, a result which is different from what is normally found in North America literature.

(In general, research in instructional psychology and technology in Venezuela has entered a stage of brisk growth and productivity. From a period of concentration on diagnostic and interpretative studies on basically institutional subjects it has passed to a period of descriptive and cuasi-experimental studies of instruction and learning and the development of technologies of instruction. There has been a noticeable increase in the number of research studies in this area.)

In Chile interest in study habits, learning strategies and affective aspects of learning has grown considerably in the last few years. There are several studies of habits or strategies (Antonijevic, 1982; Arancibia, 1986; Maira, A., Fuentes, R., Ledermann, J., Pichott, L., 1986; AraMeda, A., Caballero, G.,

Caballero, G.U., Labra, H., and Silva, M., 1986) without finding any outstanding or particularly different results, but developing the bases for further research. Also self-esteem has received attention (Valenzuela, 1984; Ferreira, R., Giruad, G., Espinoza, L., Arèvalo, B., and Donoso, R., 1986), again in studies basically of an exploratory nature. For a general summary of this areas see Chadwick (1986a).

Instructional Design and Design of Text Materials

Models for instructional design have received considerable attention in the last fifteen years but not normally as research topics, *per se*, but as transfer, adaptation and adoption processes (see particularly, Chadwick, 1978). Textbook design has recently increased in importance given that researchers are suggesting that because of the scarcity of resources in the majority of the educational systems in Latin Anmerica the textbook must play an increasingly important role (Oliveira, 1984). While considerable material has been published in this area, instead of working with experimental procedures the tendency seems to be toward the interpretation of the implications of given research, the majority of which has been done in the USA (see Chadwick, 1983).

Discussion of Problem Areas

In Latin America educational technology typically has placed more emphasis on the *processes* for achieving certain objectives than on the objectives themselves. Technologists have shown a tendency to get involved in how to make education more effective and efficient, emphasizing methodologies for making things

function and giving rather little attention to the study of just what results would be the most important. Some progress has been made in looking at the ends as well as the means, in identifying *what should be* as well as *improving what is* (see Kaufman, et. al. 1983), but the field has received considerable criticism and has developed a negative image in many sectors because of its overly 'technological' identification, and it may not be possible to improve the situation.

Terminal Behavior

Closley related to the problem of what ends to pursue is the issue of how terminal behavior is defined in educational and instructional situations. New techniques must be developed for identifying and analyzing the behavior which one presumes to teach (or which the student should have at the end of the process). Whatever the psychological position one takes (i.e.,Piagetian, behavioral or cognitive) it is necessary to carefully analyze the terminal behavior which the student should be able to demonstrate at the end of some teaching-learning intervention. The problem of defining terminal behavior and of developing techniques for its study may be one of the most important problems facing the field of instructional technology, and while it has begun to receive much more attention in the USA the theme is still quite limited in Latin America (see Chadwick, 1986b).

Democratization

An area which is of particular importance in Latin America is how the field of educational technology may help to improve

the rates of survival and levels of mastery in students participating in formal education systems (at primary and secondary levels). This subject is urgent because while access rates are generally very high (92-99% throughout the area) survival rates are much lower (roughly 50% for primary education in almost all countries). Methodologies such as student-centered education, mastery learning, individualized instruction, etc., should be more closely studied as possible ways to improve the democratization of the educational opportunities. (We presume that it is clear that equal access to formal education is not sufficient for true democratization - see Chadwick, 1976, 1981.)

Student Role

In Latin America the role of the student in the teaching-learning process continues to be fundamentally very passive. The goal of giving control of learning and of the thinking processes directly to the student remains distant. Educational technology should dedicate more efforts to designing and constructing learning situations which allow and obligate the student to take a more active role in the process and develop more self control and initiative in the student instead of simply allowing him to be a passive recipient of information. This requires teaching not only the contents associated with education but the learning strategies which the student can use to help achieve greater autonomy.

Cognitive Styles

Closely related to the above point is the necessity of recognizing and respecting the forms or styles of learning which

exist in populations as broad and diverse as those of Latin America. Most educational technologists seem to adopt the position that all people learn the same (apparently stimulated by behavioral approaches to learning). Yet each individual constructs his own view of the reality which surrounds him, developing his own internal structures, schemas, ways of organizing information and his own processes for entering and processing the information. This point has important implications. Cultures, sub-cultures, reference groups, etc. are elements of importance in the formation of the forms and styles for processing, representing, recovering and utilizing what is known. For example, the student who lives in a rural area with relatively little access to written information, with tasks and activities of caring for (shepherding) animals, with extensive experiences in barter in the local fairs, who uses a *spoken* language (such as one of the many native languages of Latin America - Quechua, Aymara, etc) will not only have a diferent construction of reality but will have totally different ways of processing information, different cognitive strategies, and obviously different interests. Magendzo (1985, page 33, citing Wolcott) suggests "the behavior of 'loafing around' of the *kuekiutl* children, which teachers interpret as 'bad motivatiòn and short atentiòn spans' actually results from a different unhurried perspective about life and the cosmos: the students appear to stop and daydream, draw or do whatever occurs to them, anything except what the teacher has planned". These same behaviors can also be found in children who live in urban extreme

poverty zones, contrasting sharply from the middle and upper class children (Antonijevic y Chadwick, 1982; Maturana y Varela, 1984; Hampden-Turner, 1981) .

Briefly, children process information in many different forms, have different ways of attending to stimuli, personal sense modality preferences (listening, seeing, manipulating, etc.) and certain types of storage preferences (episodes, images, verbal propositions, intelectual structures, motor organizations, etc.). At the same time they have distinct patterns or habits of expresion. They may come from cultures (sub-cultures, or simply family groups) which do not stimulate children to talk openly and frankly, which emphasize much caution in expression, value precise, specific knowledge instead of organized sets of knowledge, do not reinforce well organized verbal expressions, do not reinforce creative non-verbal expressions, etc. Over time all these and other elements develop certain cognitive (and affective) styles in the children which have important implications in their forms and possibilities for learning. Educators in general and educational technologists in particular should be interested in the style of learning which the child brings to the classroom in order to adapt or adjust to it, and also be able to help him amplify and extend his cognitive styles. This interest in cognitive styles will be particularly important in any interventions which include more modern media. Yet there are very few studies of the relations of cognitive style and educational technology in the Latin American area.

Effectiveness

The field of educational technology needs to more clearly demonstrate the effectiveness of its interventions in terms of utility for educational systems in Latin America. It is necessary to demonstrate which students are learning what contents, when, how and how efficiently. In general the Ministries of Education in Latin America are skeptical about educational technology because of the lack of adequate demonstrations of effectiveness. Instructional design should be oriented toward showing that students can learn more than before and for reasonable costs. Efforts in the field should identify the critical variables in teaching-learning situations and show how they can be changed. Less repitition and desertion, more basic skills learning, improved affective responses, better teacher satisfaction should be shown as results of educational technology interventions. That this should be done is obvious, but our review shows relatively few projects which area able to demonstrate these types of outcomes. It is our opinion that many projects fail to take adequate steps to show their impact, frequently by not adopting simple evaluation procedures such as using pre-tests, establishing valid control groups, or carefully designing the correct instruments to demonstrate effectiveness.

Conclusions

Instructional technology research (using the term in a more-or-less restrictive sense) is quite limited in Latin America but has begun to grow in the last decade and may be heading toward a productive period. The restraints on this type of research (lack

of funding being the primary one) will continue to impede further development. Two major areas of considerable importance in the field are transfer and implementation studies, subjects not normally seen as research, *per se*, but particularly useful in the Latin American context because adaptation and adoption of innovations is a typical and logical process in educational improvement.

Educational technology in Latin America should be asking new and different questions. It should not be asking how to use specific objectives to improve teaching but should ask what is the role of specific objectives in the development of cognitive structures in the students. It should not be asking how to use television to massify education but rather which are the critical aspects of educational television and how may they be integrated into systematic programs of educational development. It should not be asking how to apply instructional design procedures to teach specific subjects but asking what is the basic nature of student learning and how can that be facilitated through careful design of the conditions of learning. Educational technology should be making more efforts to respond to the specific necessities of the societies in which it is supposed to be functioning, making its efforts more relevant and pertinent, adjusting itself to political variables, social systems, linguistic interests of participating groups (cultures and sub-cultures), and to the demands for more democratic educational processes. From the Latin American perspective it is important to increase the willingness to intensify the participation of the

recipients of the diverse innovations. This means valuing the ideas, beliefs, interests and role of the participants, giving them greater levels of participation in those critical decisions which concern them, and responding to their cognitive styles and their interests.

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ADDENDUM:

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